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NEW

COUNTDOWN

BOOK 4

TEACHING GUIDE

THIRD EDITION



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Introduction

New Countdown 4 is the seventh stage of an eight book journey into maths designed for the mathematician of today's challenging, fast-evolving world. It includes concepts introduced earlier in the journey (place-value, the four operations, measurement, simple geometry and fractions) to a more advanced level and introduces some exciting new ideas; multiples and factors, prime and composite numbers, prime factorisation, tests of divisibility, mixed numbers and improper fractions, the knowledge of geometry, measuring and constructing angles, learning more of the secrets of triangles and quadrilaterals, and linking the concept of the right angle with that of perpendicular lines. Graph work begun in **New Countdown 3** is developed in exciting directions.

New Countdown 4 covers all the concepts recommended for Class Four learners by all major syllabuses. It also reaches beyond them in a careful and systematic way. As in the preceding books of the series, worked examples are provided for each concept introduced, and a range of practical activities are included in an attempt to guarantee the involvement of every student.

New Countdown 4 comprises eight units, each containing work which can be covered comfortably in the time available for each term. I recommend that you follow the eight units in sequence, because later portions of the books relate directly to work done or concepts discussed in earlier portions. A set of comprehensive practice sheets and Mathlab activities have been included at the end of each book.

Starting from Book 3, the workbook style followed in junior books is changed to textbook style. Thus, it is essential that each child has a notebook to write in, as he/she works through the book. Greater use of the board will be necessary to demonstrate new ideas. Tick-marks, stars, and smileys give students confidence that they are getting their work right and hence encourage swift progress.

The most important feature of the curriculum is its continued focus on the content of the Mathematics standards and this has been added in the Teaching Guide. These standards necessitate the provision of more continued, more substantive, more rigorous and more systematic instruction for students.

Planning your work and then implementing your plan are the building blocks of teaching. Therefore, this teaching guide provides detailed lesson plans, including learning objectives, learning curves, learning activities, and guidance to implement textbook exercises.

Use of resources are important, to make the lesson interesting, engaging and easy to understand. Teachers can prepare their own material or use any teaching or learning aid easily available, when required.

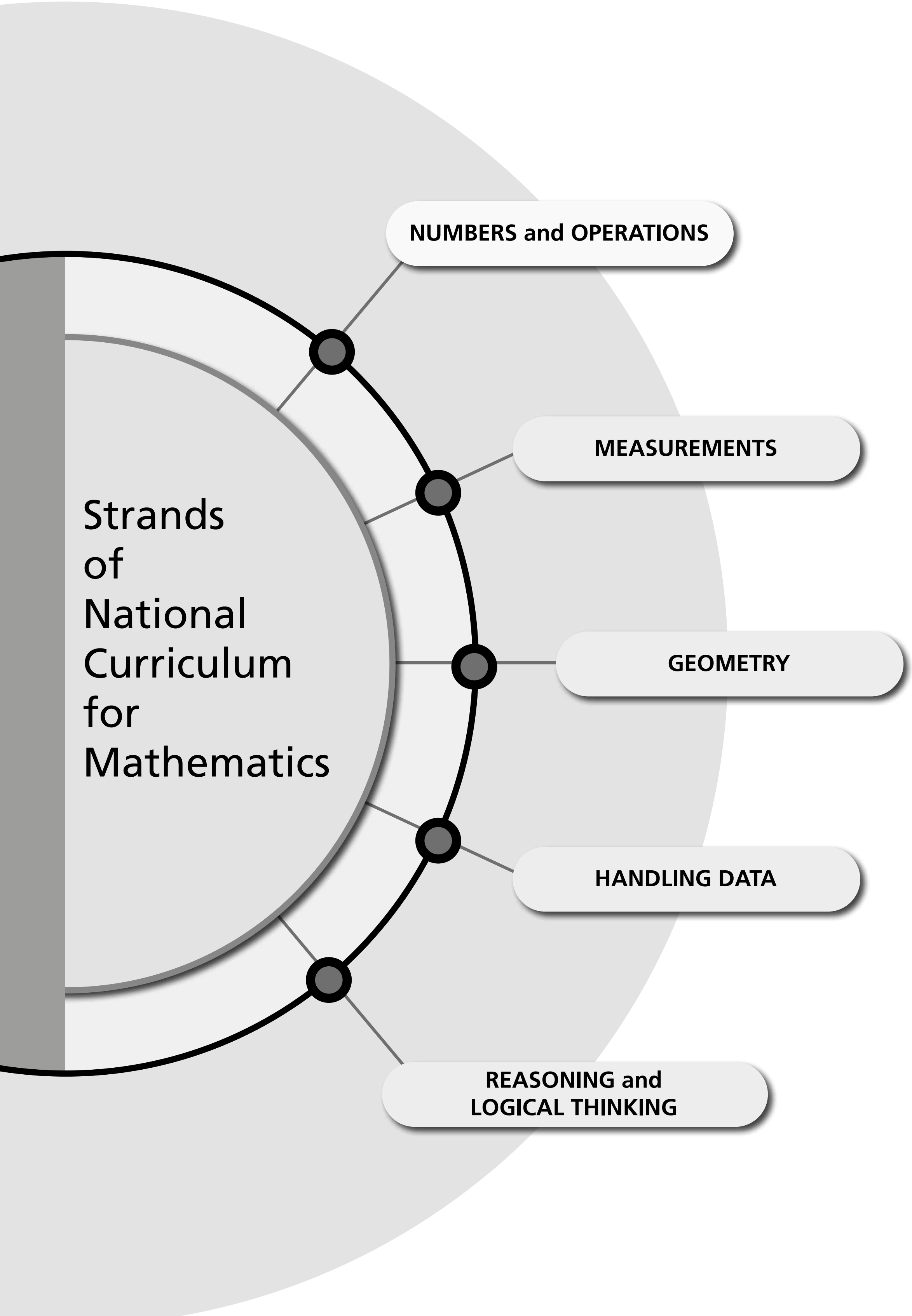
The journey till now in the New Countdown series has been very useful in exposing students to new learning. Apart from having learnt numbers and newer strategies of working with them, the students are now able to grasp new topics. They can now work independently and they are ready to absorb more.

About the Teaching Guide

The Teaching Guide offers extensive teaching ideas linked with curriculum and adaptable activities to different settings. It provides the strands and benchmarks of the National Curriculum 2006. The strands of the curriculum have been explained in an effective way as a support to teachers' teaching. Activities designed for maximum learning in the classroom and daily life are mentioned in each unit. Teachers have the liberty to use any of these or the one mentioned in the model lesson plan, or any other activity of their choice depending on the interest of the students and the time available.

A syllabus matching grid is also given to facilitate the teacher connecting the student learning objectives with the text in the book. The teaching guide emphasises the development of a positive attitude towards learning maths by enhancing memory retention, building concentration, and creating curiosity for maths. It contains a model lesson plan in each unit to implement time appropriate effective activities.

Shamlu Dudeja


Strands of National Curriculum for Mathematics
NUMBERS and OPERATIONS
MEASUREMENTS
GEOMETRY
HANDLING DATA
REASONING and LOGICAL THINKING

Syllabus Matching Grid

Left column of the following grid indicates National Curriculum SLOs, whereas the right column indicates the text book units.

Unit 1: Numbers and Numbers Operations	**Textbook Reference**
1.1 Numbers and Number Operations i) Identify place values of digits up to one hundred million. ii) Read numbers up to one hundred million. iii) Write numbers up to one hundred million. iv) Recognise numbers in words up to one hundred million. v) Compare and order numbers up to 8 digits.	Unit 1
1.2 Addition i) Add numbers up to 6 digits. ii) Solve real-life problems involving addition of numbers up to 6 digits.	
1.3 Subtraction i) Subtract numbers up to 6 digits. ii) Solve real-life problems involving subtraction of numbers up to 6 digits.	
1.4 Multiplication i) Multiply numbers up to 5 digits by numbers up to 3 digits. ii) Solve real-life problems involving multiplication.	
1.5 Division i) Divide numbers up to 4 digits by numbers up to 2 digits. ii) Solve real-life problems involving division.	
1.6 Addition, Subtraction, Multiplication and Division i) Use mixed operations of addition & subtraction and multiplication and division. ii) Solve real-life problems (using Pakistani currency as well) involving addition, subtraction, multiplication and division.	
Unit 2: Factors and Multiples	
2.1 Divisibility Test i) Identify divisibility rules for 2, 3, 5 and 10. ii) Use divisibility tests for 2, 3, 5 and 10 on numbers up to 5 digits.	Unit 2
2.2 Prime and Composite Numbers i) Define prime and composite numbers. ii) Differentiate between prime and composite numbers.	

2.3 Factors and Multiples i) List factors of a number up to 50. ii) List the first twelve multiples of a 1-digit number. iii) Differentiate between factors and multiples.	Unit 2
2.4 Prime Factorisation Factorise a number by using prime factors	
2.5 Highest Common Factors (HCF) i) Determine common factors of two or more 2-digit numbers. ii) Find HCF of two or more 2-digit numbers, using: • Venn diagram • prime factorisation method iii) Solve real-life problems involving HCF.	
2.6 Lowest Common Multiples (LCM) i) Determine common multiples of two or more 2-digit numbers. ii) Find LCM by • Common Multiples • Prime Factorisation Method iii) Solve real-life problems involving LCM.	
Unit 3: Fractions	
3.1 Fractions i) Define a fraction. ii) Recognise like and unlike fractions. iii) Compare two unlike fractions by converting them to equivalent fractions with the same denominator. iv) Arrange fractions in ascending and descending order. v) Verify the commutative property of addition of fractions with same denominators. vi) Verify the associative property of addition of fractions with same denominators. vii) Subtract fractions with unlike denominators.	Unit 3
3.4 Multiplication of Fractions i) Multiply fractions with whole numbers. ii) Multiply two or more fractions (proper, improper and mixed fractions). iii) Verify the commutative property of multiplication of fractions. iv) Verify the associative property of multiplication of fractions.	

3.5 Division of Fractions i) Divide a fraction by a whole number. ii) Divide a whole number by a fraction. iii) Divide a fraction by another fraction (proper, improper and mixed fractions). iv) Solve real-life problems involving fractions using all four operations.	
Unit 4: Decimals and Fractions	
4.1 Decimals i) Know a decimal number as an alternate way of writing a fraction. ii) Define decimal as a fraction whose denominator is 10 or a power of 10. iii) Recognize the places occupied by the digits, after the decimal point, as decimal places. iv) Identify the place value of a digit in decimals.	Unit 4
4.2 Conversion between Fractions and Decimals i) Convert a given fraction to a decimal if: • denominator of the fraction is 10 or a power of 10. • denominator of the fraction is not a power of 10 but can be converted to. ii) Convert decimals (up to three decimal places) to fractions.	
4.3 Basic Operations of Decimals i) Add and subtract decimals (up to two decimal places). ii) Multiply a decimal by 10, 100 and 1000. iii) Multiply a decimal by a 2-digit number. iv) Divide a decimal by a 1-digit number (quotient being a decimal up to two decimal places). Solve real-life problems involving decimals up to two decimal places.	
Unit 5: Measurements	
5.1 Length i) Convert: • kilometres to metres • metres to centimetres • centimetres to millimetres ii) Add and subtract expressions involving similar units of length. iii) Use appropriate units to measure the length of different objects. iv) Solve real-life problems involving conversion, addition and subtraction of units of length.	Unit 5

5.2 Mass/Weight i) Convert kilograms to grams. ii) Add and subtract expressions involving similar units of mass/weight. iii) Use appropriate units to measure the mass/ weight of different objects. iv) Solve real-life problems involving conversion, addition and subtraction of units of mass/weight.	Unit 5
5.3 Volume/Capacity i) Convert litres to millilitres. ii) Add and subtract expressions involving units of volume/capacity. iii) Use appropriate units to measure the capacity/ volume of different objects (utensils etc). iv) Solve real-life problems involving conversion, addition and subtraction of units of volume/capacity.	
5.4 Time i) Read time in hours, minutes and seconds. ii) Convert hours to minutes and minutes to seconds. iii) Convert years to months, months to days and weeks to days. iv) Add and subtract units of time without carrying/ borrowing. v) Solve simple real-life problems involving conversion, addition and subtraction of units of time.	
6 Geometry	
6.1 Geometry Box i) Know instruments of a Geometry Box i.e., pencil, ruler, compasses (sometimes called a pair of compasses), dividers (sometimes called a pair of dividers), set squares and protractor. ii) Recognise the use of pencils of grade H and HB. iii) Demonstrate the use of H and HB pencils by drawing different lines.	Unit 6
6.2 Lines i) Measure the length of a line in centimetres and millimetres using ruler and dividers. ii) Draw a straight line of given length using a ruler and dividers. iii) Draw a curved line and measure its length using thread/dividers and ruler. iv) Recognise horizontal and vertical lines. v) Draw a vertical line on a given horizontal line using set squares. vi) Recognise parallel and non-parallel lines.	

vii) Recognise parallel and non-parallel lines. viii) Identify parallel and non-parallel lines from a given set of lines. ix) Draw a parallel line to a given straight line using set squares. x) Draw a line which passes through a given point and is parallel to a given line (using set squares).	
6.3 Angles i) Recognise an angle through non-parallel lines. ii) Draw an angle AOB with vertex (0) and arms (OA, OB) to recognise the notation $\angle AOB$ for an angle AOB. iii) Recognise right angle through horizontal and vertical lines. iv) Demonstrate acute and obtuse angles via the right angle. v) Recognise the standard unit for measuring angles as one degree (1°) which is defined as $\frac{1}{300}$ of a complete revolution. vi) Measure angles using protractor where: • upper scale of protractor reads the measure of angle from left to right • lower scale of protractor reads the measure of angle from right to left vii) Draw a right angle using protractor. viii) Draw acute and obtuse angles of different measures using protractor. ix) Draw an angle (using protractor): • equal in measure of a given angle • twice the measure of a given angle equal in measure of the sum of two given angles	Unit 6
6.4 Circles i) Identify centre, radius, diameter and circumference of a circle. ii) Draw a circle of given radius using compasses and ruler.	
6.5 Quadrilaterals i) Construct squares and rectangles with sides of given measure using protractor, set squares and ruler. ii) Identify centre, radius, diameter and circumference of a circle.	
7. Information Handling	
7.1 Bar Graphs Read and interpret simple bar graph given in horizontal and vertical form.	Unit 7
7.2 Line Graphs Read and interpret simple line graph.	

Note: Unit 6: Perimeter and Area: Basic knowledge of the topic has been given in grade 3. The topic has been further enhanced in unit 6.

Teaching Mathematics at Primary Level

Teaching the Strands

Following are the five strands of The National Curriculum,

- Number and operations
- Measurements
- Geometry
- Handling data
- Reasoning and logical thinking

The significance and integration of the above first 4 strands in teaching individual units of NCD Book 4 are discussed below, whereas the fifth strand is integrated in all the units. Specifically talking about the fifth strand, students validate answers with logical reasons by solving problems involving numbers and data. They also communicate and apply analytical reasoning about geometrical shapes and figures.

Numbers and Number Operations

Help your students grasp the point that numbers of six digits and above are organised into 'periods' by giving space after every three digits from the left.

For example: 243 101; 8 923 102; 52 860 459; 731 215 821

Make generous use of the board: for example, draw the place value chart shown on page 2 and put a succession of 9-digit numbers into it. Provide plenty of practice with 6-digit, 7-digit, 8-digit numbers before moving on to 9-digit number.

Team games are also an excellent way of testing your students' ability to present big numbers in expanded form, arrange them in ascending/ descending order, identify the predecessor or successor of a given big number, and skip count accurately (in 5s, 10s, 20s, 100s, etc.)

The section on multiplication and division includes a discussion on 10 and its multiples. Spend plenty of time on the question of what happens to numbers when they are multiplied or divided by 10 or its multiples. This provides an excellent basis for the introduction of decimal fractions and decimal notation later in the book. Division work reaches a more advanced level here, featuring 4-digit dividends and 2-digit divisors. Plenty of practice sums are provided in the respective exercises, but you may want to prepare additional worksheets. Once again, emphasise the importance of writing the sums neatly and keeping columns straight.

Factors And Multiples

Here, factors and multiples are presented as entry-points to the marvelous patterns and linkages intrinsic to the world of maths. On pages 35 and 41, a simple Venn diagram is introduced to help students visualise the idea of common factors and multiples. It is strongly recommended that you reproduce this exercise on the board, going very carefully step by step, using coloured chalk to highlight the common factors and multiples. Encourage the students to make diagrams of their own.

Factors are well introduced by having the students arrange simple objects (beads, nuts, straws, etc.) grouped in different manners. Once the concept of 'factor' is grasped, students should be able to distinguishing prime numbers from composite numbers (pages 23-26). On page 32, prime factorisation is presented in terms of a tree, an idea which you might like to develop on your board. Team games will help your class learn the vital tests of divisibility. For example, you can divide the class into 4 teams: Team A for numbers divisible by 2, Team B for numbers divisible by 3, and so on. From a list of numbers, you read out one at random, and the teams decide whether the number is divisible by the pre-set numbers assigned to them. Your work on multiples and factors will have provided an excellent basis for the section on fractions, which includes the idea of reducing fractions to their lowest terms by identifying common factors (page 34).

Fractions

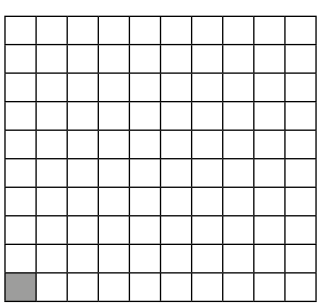
When introducing the concept of improper and mixed fractions, be sure to reproduce on the board the simple diagrams shown on page 60. Diagrams also help to convey the point that improper fractions can be expressed as mixed numbers (and vice versa). Plenty of practice sums are provided for the addition and subtraction of mixed numbers (without and with regrouping), but you may wish to develop additional worksheets here.

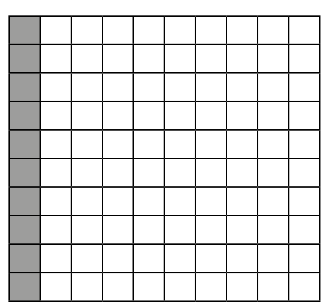
Decimals

Here, your teaching focus is on decimal fractions and on helping students to understand this simple point: that decimal notation is an extension of place value (as used for ones, tens, hundreds, etc.) The decimal point simply makes it clear where a whole number ends and the decimal fraction begins. To use decimal fractions confidently and well, your students must understand, firstly, the notation and, secondly, the equivalence of decimal fractions and common fractions. Both ideas are explained in detail in **New Countdown 4**.

When introducing the decimal notation for hundredths (page 83), you might find it helpful to provide each student with a hundred-square grid. Ask the students to count how many squares there are in each grid (100). They can then colour one of the squares and write down the fraction that has been coloured.

$\frac{1}{100}$



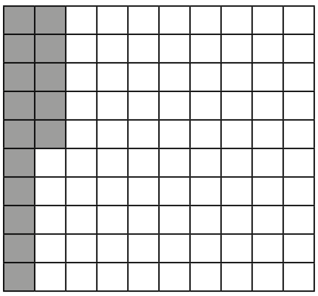


$\frac{10}{100} = \frac{1}{10}$

In the next stage, ask them to colour one whole column of squares, count the number of squares coloured (10), and think how they can express this as a fraction of the whole grid. If the students think in terms of 10 small squares, they will write the fraction as $\frac{10}{100}$. But if they think in terms of columns, they will find there are 10 columns altogether and that they have coloured one of them, or $\frac{1}{10}$ of the grid. In decimals, this means that 0.1 of the grid is coloured.

The following equivalence is now established: $\frac{10}{100} = \frac{1}{10} = 0.1$

Thirdly, ask the students to colour 15 squares:



Ask them how they can express these squares as a fraction of the whole grid. They may answer in several ways: $\frac{1}{10} + \frac{5}{100}$, or $\frac{10}{100} + \frac{5}{100}$, or $\frac{15}{100}$ or 0.1 + 0.05. Whichever way they choose, they will find that, in place value terms, there is no column to accommodate $\frac{15}{100}$. At this point, the hundredths (h) column can be introduced, and the decimal notation, 0.15, discussed. Reinforce the point that this decimal fraction can be written as:

0.15, or $\frac{1}{10} + \frac{5}{100}$, or $\frac{10}{100} + \frac{5}{100}$, or $\frac{15}{100}$

Once decimal notation is understood as an extension of place-value, students should have no difficulty in handling thousandths (page 86). The discussion of the metric system reinforces understanding besides providing plenty of opportunity for practical work with decimals.

Measurement

Students understand and use the four operations with accuracy dealing with length, weight, and capacity using the metric system. The students have already worked with concepts of length, weight, and capacity in the previous classes. In this chapter, they are introduced to the basic units of measurement, for bigger or smaller values.

Perimeter and Area

To introduce the concept of area, a variety of geometrical grids are shown. Ask your students which of the grids they think is the easiest to use, in most cases they will identify the square as the most convenient measure. Half-squares are introduced, bringing the students closer to the problem of estimating the area of irregular shapes. When you discuss the two leaves shown against a grid on page 139, examine with the students, the following method for dealing with parts of squares covered:

1. If the part covered is less than half a square, ignore it.
2. If the part covered is greater than half a square, count it as a whole square.

Make sure all the students have access to squared paper as they work through this section. If a grid of centimetre squares is provided, the idea of a square centimetre can easily be introduced as the amount of space covered by one of the squares.

By now accustomed to the clock-face and its divisions, your students should have no difficulty in telling the time to the exact minute (pages 125-128). Make sure they have a lot of practice in handling 12-hour clock time and 24-hour clock time; once again, it is important that students move confidently between the two methods. When introducing timetables, you need to have a real railway or flight timetable which the students can look at and discuss.

Introduction to a.m. and p.m. time is given on pages 126 and 127.

Geometry

For the section on geometry, you might find it helpful to prepare worksheets of large-sized angles which students can measure with their protractors. Once they have gained confidence in handling the instrument, the smaller angles set out in New Countdown 4 will provide ample practice.

Information Handling

Students learn to find relationships between given sets of data quickly, using bar graphs and line graphs.

The students have worked with pictographs and block graphs earlier. Now, students are ready to learn about bar graphs and line graphs. It provides an opportunity for exciting practical work. Line graphs are particularly useful when we want to measure something which is gradually changing, for example, a relation between cost and commodity. Give your students plenty of practice in reading data from simple line graphs, discussing why some graphs take the form of a straight line while others show variation.

Before students attempt the exercise, make sure you have thoroughly discussed how the axes of the graph should be positioned and how the squares of graph paper should be used. Follow up this exercise with your own variants; for example, packets of pop-corn sold at a fun-fair over the course of a day, or the number of students entering a museum one Sunday afternoon.

Developing a Positive Attitude towards Mathematics

To this point, the New Countdown series has been very useful in exposing students to new concepts. Apart from having learnt numbers and newer strategies for working with them, the students are now able to grasp new topics. They can now work independently and their minds are ready to absorb more. New Countdown 4 follows the same activity-based 'visual' format of the previous books in the series.

The primary aim of the **New Countdown** series is to ensure that every child develops a strong affinity for mathematics, and for this, the following are necessary:

- A tension-free and fun-filled atmosphere
- Concentration building
- Logical thinking
- A questioning mind
- Ability to answer without hesitation
- A retentive memory
- A sense of discovery (rather than 'being taught')
- Lateral thinking

Tension-Free and Fun-Filled Atmosphere

Such a learning environment establishes greater bonding between the students and the teacher and leads to healthier mental growth, greater confidence and better learning. Being in a comfortable, familiar, and friendly environment itself, builds confidence.

The more confident a child is, the easier it is for him or her to absorb new concepts, as the year progresses. It is firmly believed that students begin to get more joy by learning new concepts through discovery. If the lessons are based on such mores, there is no reason why the student will not grow up to be a happy and caring child with a bright, thinking mind.

Concentration Building

A student cannot perform well in the classroom if he/she is not attentive, distracted, or facing difficulty in focusing on the work at hand. Concentration or attention enhances students' understanding and retention. Mostly students will concentrate on fun activities, but it is crucially important to concentrate on all kinds of tasks done in the classroom to improve learning and build confidence. Given below are some strategies to enhance the concentration span in the classroom.

- Set an appropriate amount of time to complete the task. This may bind a student to focus on the given task so that he/she could complete it within time limits.
- Divide big task into parts. As shorter amount of time and one task at a time may become an easier job for the students. A big task requires a longer time and more concentration and focus that may become a reason for distraction.
- Give them enough physical activity to avoid restlessness and make it easier to focus on the task.
- Allow some free time before beginning a new task.

- Reinforce positive behaviour.
- Introduce a reward system by praising the students or allowing them time to read their favourite book.
- Some games may be helpful to increase concentration span:
- Just Sit: This game is played by challenging the students to sit in their chairs without moving to see how long they can do it.
- Statue: The teacher says 'statue' and everyone will be still in whatever position they are, for a few minutes.

Like any skill, concentration can be built and improved with consistency.

Logical Thinking

Every page in all the books in this series lays stress on logical thinking. The moment a child gets into 'logic' mode, thought, concentration and retentive memory will be the natural outcomes.

A Questioning Mind

If we want our students to be above-average achievers, we should encourage them to ask as many questions as they wish to. A question from one child will invariably lead to more questions from other students in the class. This is a very healthy outcome. There may be times when the teacher does not have an immediate answer to a question; there is no need to be ashamed of this, as long as it is ensured that the answer is found within a day or two.

Ability to Answer Questions without Hesitation

It is important for a teacher to get into question-answer sessions with students, as often as possible. The mother of a well-known intellectual recently said that the reason for her son's brilliant performance in life was that he always asked too many questions and offered to give answers even when he was not specifically asked. The habit of trying to answer as many questions as possible should also be inculcated.

A Retentive Memory

Any kind of learning which is based on concentration, logical thinking, asking questions and finding answers will automatically lead to retentive memory. The power of retentive memory as a tool for learning at any stage in life can never be undermined. Rote learning uses two senses at the most—listening and seeing (reading), whereas activity-based learning, involves touching (doing) all the time, and smelling and tasting too, on a few occasions, in addition to listening and seeing. The greater the number of senses used for a learning exercise, the better will be the concentration leading to improved speed of understanding, retention, logic, and application. It would be great fun if the art and craft classes, off and on, incorporate mathematical shapes, concepts, and language. The joy that students derive out of such a learning experience is an added bonus.

A Sense of Discovery

Discovery is always more joyous than being told. If a mother tells her son that his teacher loves him, the son believes her, but if he discovers the teacher's love through a hug or a pat on the back, imagine the joy. The same applies to learning in Mathematics.

The sense of joy or pleasure at discovering new things, which is missing in rote learning, is a great accelerator for learning. Each discovery is the result of a practical activity.

Lateral Thinking

By this time students know several number facts and are comfortable with addition, subtraction, multiplication, and division. Concepts such as multiplication being a form of repeated addition, and division being a form of repeated subtraction, are used in everyday life without the necessity of going back to the basics. This is an example of lateral thinking.

Vertical learning would be to learn 2s tables, then 3s, then 4s and so on. Lateral thinking would entail understanding the facts behind the tables and applying these to solve everyday problems. In today's times, more than ever before, it is important that students think, learn to think and apply their knowledge laterally, i.e. they apply the knowledge gained from books to their surroundings, throughout the day.

Features of the Teaching Guide

The Teaching Guide contains the following features. The headings through which the teachers will be led are explained as follows:

Suggested Time Frame

Timing is important in each of the lesson plans. The guide will provide a suggested time frame. However, every lesson is important in shaping the behavioural and learning patterns of the students. The teacher has the discretion to either extend or shorten the time frame as required.

Learning Curve

It is important to highlight any background knowledge of the topic in question. The guide will identify concepts taught earlier or, in effect, revise the prior knowledge. Revision is essential, otherwise the students may not understand the topic fully. The initial question when planning for a topic should be how much do the students already know about the topic? If it is an introductory lesson, then a preceding topic could be touched upon, which could lead on to the new topic. In the lesson plan, the teacher can note what prior knowledge the students have of the current topic.

Each topic is explained in detail by the author in the textbook supported by worked examples. The guide will define and highlight the specific learning objectives of the topic. It will also outline the learning outcomes and objectives.

Real-life Application

Today's students are very proactive. The study of any topic, if not related to practical real-life, will not excite them. Their interest can easily be stimulated if we relate the topic at hand to real-life experiences.

Frequently Made Mistakes

It is important to be aware of students' common misunderstandings of certain concepts. If the teacher is aware of these they can be easily rectified during the lessons. Such topical misconceptions are mentioned to support teachers.

Summary of Key Facts

Facts and rules mentioned in the text are listed for quick reference.

Suggested Activities

This teaching guide provides you enough hands on activities for making your lesson plan more interesting and engaging. These activities will have more impact on students' learning.

Model Lesson Plan

Planning your work and then implementing your plan are the building blocks of teaching. Teachers adopt different teaching methods/ approaches to a topic.

A model lesson plan is provided in every unit as a preliminary structure that can be followed. A topic is selected and a lesson plan is written under the following headings:

Topic

This is the main topic/sub-topic.

Duration

The suggested time duration is the number of periods required to cover the topic. Generally, class dynamics vary from year to year, so flexibility is important.

The teacher should draw his/her own parameters, but can adjust the teaching time depending on the receptivity of the class to that topic. Note that introduction to a new topic takes longer, but familiar topics tend to take less time.

Specific Learning Objectives

This identifies the specific learning objective/s of the sub-topic being taught in that particular lesson.

Key Vocabulary

List of mathematical words and terms related to the topic that may need to be pre-taught.

Resources: Teaching and Learning Aids (Optional)

This section includes everyday objects and models, exercises given in the chapter, worksheets, assignments, and projects.

Strategy

Starter: Engagement Activity

The lesson can begin with something interesting, such as telling a story, relating a real-life experience or an everyday event which may or may not lead to the topic; but is interesting enough to capture the attention of the students. Involving students in a discussion to find out how much knowledge they have of the topic being taught is also a good strategy. Teachers can use their own creativity to come up with ideas to create a sense of fun.

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Main Developmental Activity

Learning needs to start with practical activities, therefore the main developmental activity is the first step that leads to actual learning, which in turn leads to the required outcome of the lesson. This activity can be planned as individual work, pair or group work as per requirement. Working individually creates self-confidence where the child enjoys a sense of self-achievement, whereas pair and group activities create a sense of discovering and learning together.

These activities enhance concentration and improve retention of memory. Through these activities the teacher can build understanding of concepts in a fun-filled way. It is easier for students to grasp the concepts and then move from abstract to concrete.

Written Assignments

Finally, written assignments can be given for practice. It should be noted that classwork should comprise sums of all levels of difficulty, and once the teacher is sure that students are capable of independent work, homework should be handed out. For continuity, alternate sums from the exercises may be done as classwork and homework.

Supplementary Work (Optional): An activity or assignment could be given. It could involve group work or individual research to complement and build on what students have already learnt in class.

The students will do the work at home and may present their findings in class.

Wrap up

At the end of each sub-topic, a wrap up should be done using various strategies. For example, a quick question and answer session involving the whole class, challenging students with a question to check their understanding of the concept taught.

1 Number and Arithmetic Operations

Suggested Time Frame

12-14 periods

Learning Curve

Students have already worked with numbers up to 6 digits. Here, they will deal with numbers up to 9 digits. Previously they have added and subtracted numbers up to 4 digits, this will lead them to add and subtract numbers up to 6 digits. Students are familiar with multiplication and division (2 digit number by a 1 digit number) now they will be dealing with multiplication and division of 4-digit numbers by 2-digit numbers. They will be able to apply this knowledge to solve daily life problems involving four operations.

Real-life Application

We have numbers all around us. We use them in different ways.

- Maths helps in building things. For constructing a building we find the area of each space and estimate the expenditure.
- In the grocery store we purchase things and use mathematics to pay for them.
- While baking in the kitchen we use numbers and operations to mix the correct amounts of ingredients.
- If we plan a journey we need to estimate the expenses of tickets, accommodation, and food.
- Saving money also needs mathematical operations.

Frequently Made Mistakes

- The students mix in place values while dealing with bigger numbers.
- They make mistakes in writing numbers in the correct columns while adding or subtracting.
- They get confused in distinguishing between the dividend and divisor.
- They make mistakes in multiplication and division sums because they have not learnt the times tables.

Summary of Key Facts

- Comparing numbers is the same as knowing which number is smaller and which number is bigger.
- Symbolically, a smaller sign is denoted as '< ' and a greater sign is denoted as '>'.
- The multiplicand is the number or quantity to be multiplied. The multiplier is the number or quantity by which the multiplicand is to be multiplied. The product is simply the end result of the multiplication.
- The dividend is the number or quantity to be divided. The divisor is the number or quantity by which the dividend is to be divided. The quotient is simply the answer of the division.
- 'Remainder' is the quantity which is left after division.

Suggested Activities

Individual/Pair Activity (10 mins)

Learning Outcome: Add numbers up to 6 digits.

Resources: Activity Cards.

Instructions:

- Prepare the activity cards for each student.
- Sample of the activity card given.
- Student has to add the rows horizontally and columns vertically and write the answer in the given space.
- Get the activity cards peer checked.

Sample Activity Card

Complete these addition squares. Add the rows and columns to find the totals.		
357890	29541	
378201	268975	

Individual/Pair Activity (10 mins)

Learning Outcome: Subtract numbers up to 6 digits

Resources: Activity Cards

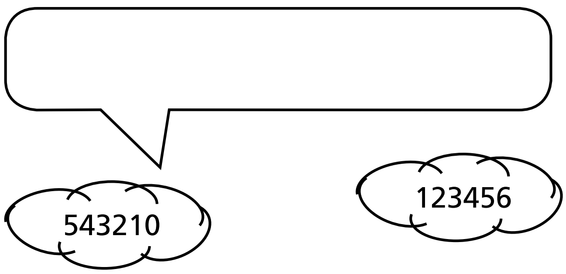
Instructions:

- Provide each student with an activity card with subtraction sums of complex numbers.
- Time the activity and get the activity cards peer checked.

- Sample of the activity card is given below.

Activity Card

Work out the difference between the pair of numbers:



Individual Activity (20 mins)

Learning Outcome: Multiply/divide numbers up to 4 digits by 2 digits.

Resources: Activity Cards

Instructions:

- Provide each student with an activity card with two word problems.
- Time the activity and get the activity peer checked.
  (Sample of the activity card is given below).

_________ cherries each day.	Javeria has a bag of 45 cherries to evenly split up into her 3 school lunches for the week. How many cherries will she get to eat each week?
_________ words in an hour.	Shahid started typing his story book over the weekend. He typed for 3 hours and completed 15 pages with 240 words on each page. How many words did he type in an hour?

Group Activity (20 mins)

Learning Outcome: Read/Write numbers up to one hundred million in numerals and words.

Resources: White boards, markers, cards with 9-digig numbers in words.

Instructions:

- Divide your class into 4 groups A, B, C, and D.
- The first competition will be between A and B.
- One member of group A will pick a card and reads the number.
- A member of group B will write that number in figures on the white board and show it to the teacher.
- Now, group B will pick a card and group A will write the number in figures on the white board.

- Three card will be picked by each group.
- Teacher will decide the winner according to the number of correct answers.
- The same procedure will be repeated by groups C and D.
- Now the two winner groups will compete against each other.
- This time the teacher will read a number and the group that write the correct answer first, will be the winner.

Model Lesson Plan

Topic

Introduction of numbers up to 9 digits.

Duration

80 minutes

Specific Learning Objectives

By the end of the lesson students will be able to identify place values of digits up to the hundred millions.

Key Vocabulary

million, place value

Resources

Place value chart on small cards, a big place value chart.

Strategy

Starter: Engagement Activity (5 mins)

Write a number on the board, for example, 909 437. Ask the students the place value of each digit.

Help the students if there is any ambiguity.

Main Developmental Activity (20 mins)

Distribute place value chart cards to the students and ask them to paste in their notebooks.

Millions			Thousands			Ones		
HM	TM	M	HTh	TTh	Th	H	T	U

Tell them to write 100 000 in the place value chart.

Ask the students to guess the biggest 6-digit number i.e. 999 999.

Tell them that the next number will be 1 000 0000 which is a 7-digit number. Ask them to put this number in the place value chart.

Highlight that the number of digits moves one column towards the left increasing the value of the number.

Similarly, make 8-digit and 9-digit numbers. Explain using the place value chart that a 7-digit number is a million, 8-digit number is ten million, and 9-digit number is hundred million.

Emphasise the abbreviations HM, TM, and M.

Give them several examples of 7, 8, and 9 digit numbers by writing on the board emphasising the place value of a million, ten millions, and hundred millions.

Tell them that ordering and comparing of 9-digit numbers follows the same rule as for 6-digit numbers.

Pair work (10 mins)

Write some 7, 8, and 9 digit numbers on the board with a ringed/ bold digit. Ask the students to identify their value by writing them in the provided place value chart. For example: **2** 952 602;

238 9**0**2 185; 6**9** 732 415; **9**80 053 465.

Written Assignments (40 mins)

Ex 1a Q (7, 11,13, and 14)

Wrap up (5 mins)

Give them three 9-digit numbers in words on the board and ask them to write them in numerals in the place value chart given to them.

2 Factors and Multiples

Suggested Time Frame

12-14 periods

Learning Curve

The students already know about multiples of 10. Here they find out the multiples of other numbers and then common multiples between two or more numbers. Thereafter, they find the LCM.

Next, the students list the factors of a number and identify the common factors between the two numbers. In this way they identify the HCF. To make the calculation of LCM and HCF easy, students are introduced to co-prime numbers, prime numbers, composite numbers, and prime factors.

Real-life Application

HCF is used to:

- split things into smaller sections.
- equally distribute 2 or more sets of items into their largest grouping.
- figure out how many people can be accommodated in a place.
- arrange objects into rows or columns.

LCM is used to:

- tell about an event that is or will be repeating over and over.
- purchase or get multiple items in order to have enough.
- figure out when something will happen again at the same time.

Frequently Made Mistakes

- Students get confused in identifying factors and multiples.
- Errors due to not remembering the times tables.

Summary of Key Facts

- Any number with 0, 2, 4, 6, 8 at the unit place is divisible by 2.
- If the digits of any number add up to a number which is divisible by 3, then the original number is also divisible by 3.
- Any number with 0 or 5 at the unit place is divisible by 5.
- Any number with 0 at the unit place is divisible by 10.
- A prime number has only two factors that is 1 and the number itself.
- Composite numbers have more than two factors.
- Factors of a number are limited.
- Multiples of a number are unlimited.
- Every number is a factor of itself.
- 1 is a factor of every number.
- Composite numbers can always be arranged in exact rectangles.

Suggested Activities

Pair Activity (20 mins)

Learning Outcome: Use divisibility tests for 2, 3, 5, and 10 to numbers up to 5 digits.

Resources: Activity Cards

Instructions:

- Revise the divisibility rules with the class.
- Provide each pair with an activity card (sample given below).
- Time the activity and announce the winning pair.

Use the divisibility rules to check whether each given number is divisible by 2, 3, 5 or 10. Write Yes or No.				
Number	Divisible by 2	Divisible by 3	Divisible by 5	Divisible by 10
18702	YES	YES	NO	NO
24900				
15672				
87534				
42207				
59345				

Individual Activity (20 mins)

Learning Outcome: Differentiate between Prime and Composite Numbers.

Resources: Activity Cards

Instructions:

Provide students with the activity cards and allow them some time to think about prime numbers and composite numbers. Use their knowledge to solve the question on the activity card.

Activity Card

Identify the prime numbers and add them together

1 3 7 11 15 19 23 6 10 16 18 25

Is the total a prime number? ____________________

Complete the equations and circle the answers that are prime.

1. $7 \times 5 =$	2. $15 + 14 =$	3. $10 + 11 =$
4. $12 + 2 =$	5. $60 - 29 =$	6. $4 \times 8 =$

Individual Activity (25 mins)

Learning Outcome: Find the HCF of two or more numbers.

Resources: Card sheet in light colours, Printer, Scissors

Instructions:

- Make plenty of cut-outs of multicolour flowers and place them in a basket.
- Make cut-outs of large flowerpots according to the number of students.
- On each flowerpot, paste different numbers that you want your students to find the factors of. Ensure the numbers are bold and clearly visible.
- Write the same numbers on the board, ask the students to find all the factors for each of the numbers and write them over the flowers. The flowers will be put back into the basket. Ensure the numbers are bold and clearly visible.
- Now, give one flowerpot to each student and have them sort the flowers from the basket with correct factors of the numbers written on the flower pot. Ask them to paste the flowers on their flowerpots.
- You can make the activity more challenging by setting a time limit.

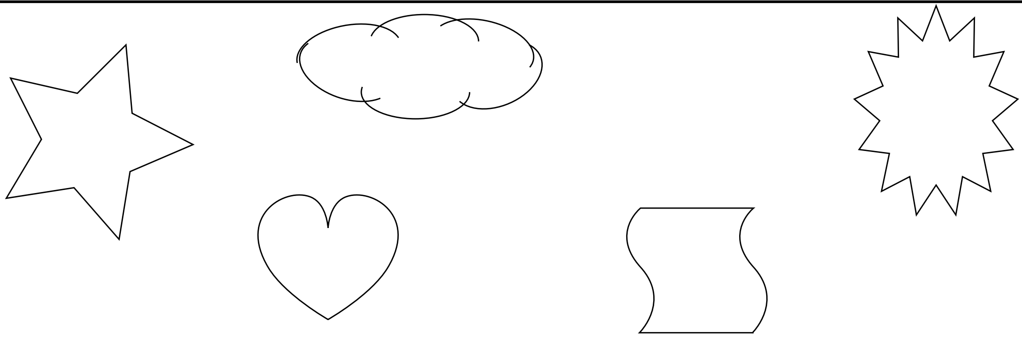
Individual Activity (10 mins)

Learning Outcome: List the factors of a 2-digit number.

Resources: Worksheet

Instructions: To find all possible factors of a number.

How many different numbers can you use to divide 12? Write them below:



Model Lesson Plan

Topic: HCF

Duration

80 minutes

Specific Learning Objectives

By the end of the lesson students will be able to find Highest Common Factors.

Key Vocabulary

factors, Highest Common Factors

Resources

Worksheets, cut-outs, glue stick.

Strategy

Starter: Engagement Activity (5 mins)

Ask multiplication facts randomly involving the whole class. For example, what is four times five, what is 8×4, or what is product of 3 and 2? This activity will reinforce the vocabulary related to mutiplication and help the students recall the multiples and factors.

Main Developmental Activity (20 mins)

Write 3 numbers on the board. As students are already familiar with finding factors, ask them to find the factors of the given numbers in their notebooks.

Factors of 6 = 1, 2, 3, and 6 Factors of 4 = 1, 2, and 4 Factors of 8 = 1, 2, 4, and 8

Ask them to point out the factors which are common to all the given numbers. Tell them that the common factors of 6, 4, and 8 are 1 and 2. Therefore the highest common factor is 2.

Now write three 2-digit numbers on the board and ask the students to find out the HCF of the given numbers. Help them in calculating the factors. Then ask them to write the highest common factor on the white board and show it to you. For any wrong answer help the student in finding the correct answer.

Written Assignment (35 mins)

Ex 2 e. Q (5 and 6).

Wrap up (10 mins)

Ask the students, what will be the common factor of any three prime numbers?

3 Fractions

Suggested Time Frame

12-14 periods

Learning Curve

The students already know how to add and subtract 'like' fractions. They have learnt mixed fractions, equivalent fractions, ordering and comparing of like fractions. Here, students will deal with unlike fractions to:

- Identify and compare two fractions.
- arrange fractions in ascending and descending order.
- simplify fractions to the lowest form.
- verify the commutative and associative law of addition and multiplication of like fractions.

Furthermore, they will apply their knowledge to solve real life problems involving fractions.

Real-life Application

Fraction plays an important role in daily life.

Fractions are used:

- in baking to tell how much of an ingredient to use.
- in telling time; each minute is a fraction of the hour.
- to determine discounts when there's a sale going on.

Summary of Key Facts

- Like fractions have the same denominator.
- Unlike fractions have different denominators.
- Equivalent fractions are obtained by multiplying or dividing the numerator and the denominator of a fraction by the same number (not 0).
- A fraction with the numerator 1 is known as a unit fraction.

- A fraction having numerator smaller than the denominator is called a proper fraction.
- A fraction having numerator equal to or greater than the denominator is called an improper fraction.
- A mixed fraction is made up of a whole number and a proper fraction.
- Fractions satisfy the commutative and associative laws of addition.
- Fractions satisfy the commutative and associative laws of multiplication.
- When a fraction is multiplied by its reciprocal, the product is always 1.
- Two numbers whose product is 1 are the reciprocal of each other.
- Dividing a whole number by a fraction: change the division sign to a multiplication sign and take the reciprocal of the fraction and simplify.

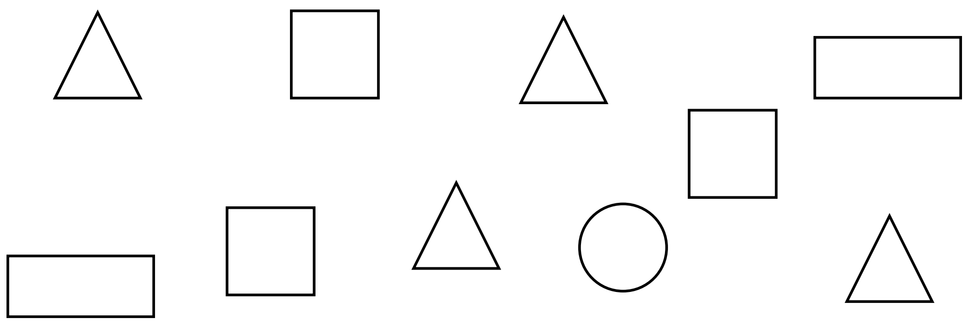
Suggested Activities

Individual Activity (15 mins)

Learning Outcome: Making the fractions.

Resources: Worksheet

Instructions: Look at the shapes and answer the questions given below.



1. How many shapes are there? ______________
2. What fraction of the shapes are squares? ______________
3. What fraction of the shapes are rectangles? ______________
4. What fraction of the shapes are triangles? ______________
5. What fraction of the shapes is the circle? ______________
6. What fraction of the shapes are not triangles? ______________
7. What fraction do the triangles and the circle represent altogether? ______________
8. Which shape has the greatest fraction? ______________
9. Which shape has the smallest fraction? ______________

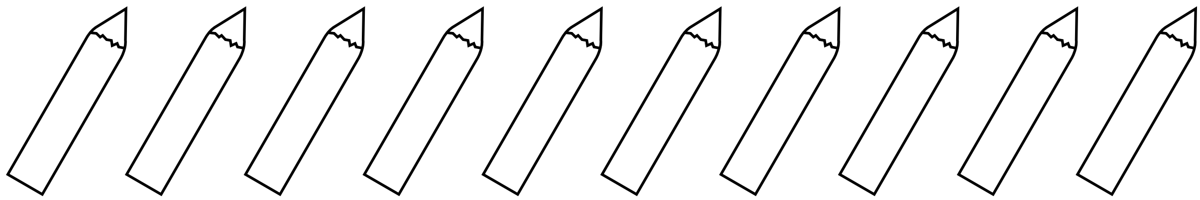
Individual Activity (20 mins)

Learning Outcome: Solve real life problems involving fractions.

Resources: Worksheet

Instructions: Prepare the worksheet as given below.

Basim buys a new colouring box. He has a picture of 10 pencils. He colours the pencils as given below:



First, he colours 1/10 of the pencils. (Colour them red).

Then, he colours 1/3 of the remaining pencils. (Colour them blue).

Lastly, he colours half of the remaining pencils. (Colour them green).

How many pencils are left without colour? Write your answer as a fraction also.

____

Individual Activity (20 mins)

Learning Outcome: Add/ Subtract fractions with different denominators.

Resources: Worksheet/Activity Cards

Instructions:

- Reinforce the concept of four operations involving fractions.
- Give the following activity card to each student.

Activity Card
Manahil loves jam, and has a great jam recipe. She uses ¾ kg of strawberries and $\frac{1}{2}$ kg of blueberries to make one bottle of jam. How many kilograms does she need altogether to make one bottle of jam? Show your working below:
Sabeen made $16\frac{2}{3}$ litres of lemonade for a party. At the end of the party, she had $3\frac{1}{6}$ litres left. How many litres of lemonade were consumed? Show your working below:

Individual Activity (20 mins)

Learning Outcome: Multiply/divide fractions with different denominators.

Resources: Worksheet/Activity Cards

Instructions:

- Reinforce the concept of four operations on fractions.
- Provide each student with the activity cards given below and then get it peer checked in the end.

12 ½ kg of tomatoes are divided equally into 4 baskets. How many kilograms will be filled in one basket?
Faiz travelled 5 ¼ km in one day. If he travels with the same speed, how long will he travel in 8 days?

Model Lesson Plan

Topic

Fractions

Duration

80 (mins)

Specific Learning Objectives

By the end of the lesson, students will be able to arrange the given fractions in ascending order.

Key Vocabulary

fraction, ascending, descending ,order, like, and unlike

Resources

Worksheet

Strategy

Starter: Engagement Activity

Recall (5 mins)

Start your lesson with a recall of different types of fractions. Discuss the rule of making equivalent fractions. Recall that when denominators are the same, the fraction with the greater numerator is greater.

Main Developmental Activity (20 mins)

Reinforce the concept of like and unlike fractions and revise rules for comparing unlike fractions. Write some fractions on the board. Call a few students one by one to convert them into equivalent fractions.

Provide each student with one of the activity cards given below. Solve the first question on the board involving the students. They will solve the second question on their own.

Jasim's mother gave him a recipe for cake mix, which included $\frac{5}{8}$ cup flour, $\frac{1}{3}$ cup peanuts, $\frac{1}{4}$ cup almonds, and $\frac{1}{2}$ cup raisins. Put the fractions in order from smallest to greatest in the boxes below. Smallest ☐ ☐ ☐ ☐ Greatest
In fifteen minutes, Ehsan walked $\frac{3}{5}$ km, Junaid walked $\frac{3}{4}$ km, and Kashif walked $\frac{1}{2}$ km. Compare the distances walked by each person, writing 'more' or 'less'. Ehsan walked ______________ than Kashif. Junaid walked ______________ than Ehsan. Kashif walked ______________ than Junaid Who walked the furthest, and who walked the shortest distance? ______________ walked the most. ______________ walked the least.

Feedback (10 mins)

Worksheets will be checked by peers. Then ask the students what they learned?

Written Assignments (40 mins)

Ex 3a Q (6, 7, and 8).

Wrap up (5 mins)

Ask the students which one is the greatest of $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{9}$.

4 Decimals

Suggested Time Frame

8-10 periods

Learning Curve

Children have used the decimal point when working with money in Class 3. In this book they learn about decimal places: tenths, hundredths, and thousandths and carry out the four basic mathematical operations with decimal fractions.

Decimals have lots of importance in real life, especially when we purchase commodities or deal with interest rates of credit cards or see the average of any cricketer's striking rate or run rate.

Frequently Made Mistakes

- Students do not align the decimal point, while adding or subtracting decimals numbers.
- They forget to put the decimal point while adding, subtracting, multiplying, or dividing the numbers.

Summary of Key Facts

- The decimal point is a point that separates whole numbers from decimal fractions.
- The number of digits after the decimal point gives the number of places in a decimal number.
- Zeros to the right of a decimal point after the digits have no value.
- Zeros to the left of a decimal point before the digits have no value.
- Fractions can easily be converted to decimals, provided their denominators are multiples of 10 or 100.

- When we change a decimal into a fraction, we may need to reduce the fraction to its lowest terms.
- While adding and subtracting decimal numbers, keep the decimal points in the same column.
- When we multiply a decimal number by 10, 100, 1000, the value of the number increases by 10 times, 100 times, and 1000 times.
- When we divide a decimal number by 10, 100, 1000 the value of the number decreases by 10 times, 100 times, and 1000 times.

Suggested Activities

Individual Activity (10 mins)

Learning Outcome: Convert given fractions to decimals and vice versa.

Resources: Worksheet

Instruction: Prepare the following worksheet for the whole class.

Convert the fractions into decimals and decimals into fractions.	
Fraction	**Decimal**
$\frac{37}{100}$	
	0.053
$\frac{47}{10}$	
	1.45
$\frac{69}{100}$	
	12.2
$\frac{9}{10}$	

Pair Activity (20 mins)

Learning Outcome: Add decimals up to two decimal places.

Resources: Worksheet.

Instructions:

- Prepare worksheets like the sample given opposite.
- Divide your class into pairs.
- Give each pair a worksheet to solve.
- The pair to get the maximum correct answers wins.
- The winner pair then designs a question or questions for the whole class to solve on their whiteboards.

8.26 + 2.15	3.64 + 4.61	4.35 + 4.14
7.82 + 1.17	2.78 + 3.54	9.65 + 1.81
5.34 + 7.46	8.26 + 1.62	4.81 + 2.23

Individual Activity (20 mins)

Learning Outcome: Convert fractions into decimals.

Resources: Worksheet.

Instructions:

- Make fraction number cards with denominators 10, 100, and 1000.
- Make respective decimal number cards.
- Put the fraction number cards upside down on the table.
- Place the decimal number cards open on the table.
- Ask the students to take out their whiteboards.
- Call one student and tell him/her to turn up one card and show it to the class.
- Ask him/her to pick the decimal number card matching with the fraction but does not show to other students.
- Ask rest of the students to write the respective decimal number on their whiteboard in thirty seconds and hold them up to show you.
- The student who picked up the card will also show his card to you. You can see all the right and wrong answers and provide guidance.

Sample cards:

Fraction number card	Decimal number card
$\frac{12}{100}$	0.12

Individual Activity (25 mins)

Learning Outcome: Convert decimals to fractions

Resources: Worksheet

Instructions:

Each decimal on the left is equal to one of the fractions on the right. Write the letter of the fraction on the line next to the corresponding decimal.	
0.33 _______	**A. 1/2**
0.25 _______	**B. 7/20**
0.75 _______	**C. 7/10**
0.15 _______	**D. 1/3**
0.80 _______	**E. 1/5**
0.66 _______	**F. 13/20**
0.50 _______	**G. 1/4**
0.45 _______	**H. 12/25**
0.60 _______	**I. 9/20**
0.85 _______	**J. 3/4**
0.35 _______	**K. 22/25**
0.48 _______	**L. 3/5**
0.95 _______	**M. 3/20**
0.88 _______	**N. 11/20**
0.20 _______	**O. 4/5**
0.70 _______	**P. 2/3**
0.65 _______	**Q. 17/20**
0.55 _______	**R. 19/20**

Model Lesson Plan

Topic

Addition of decimals involving real life situations.

Duration

80 minutes

Specific Learning Objectives

By the end of the lesson students will be able solve real life problems involving decimals up to two decimal places.

Key Vocabulary

Decimals

Resources

Activity worksheet, gardening tools (toys).

Strategy

Starter: Engagement Activity (5 mins)

Ask the students where they find decimals in real-life? Start jotting down their responses on the board. Recalling their previous knowledge, proceed to the following activity. They have done addition subtraction, and multiplication of decimals.

Main Developmental Activity (20 mins)

You should have already collected the toy gardening tools as mentioned below. Tie a washing line in the classroom and hang the tools with price tags on them.

Divide the class into groups of 5. Provide the activity sheet to each group and ask them to check the price on washing line and solve the questions on the sheet. Ensure equal participation among the students.

Get the sheets peer checked in the end.

1. Price Tags will be as follows:

Lawn mower	Grass seeds	Large Pot	Spade	Hedge Trimmer	Fork
Rs 9455.75	Rs 60.70	Rs 100.40	Rs 350.23	Rs 420.38	Rs 420.38

Look at the price tags answer the following questions.

1. What is the cost of a spade, a fork and some grass seeds?	
2. How much change from Rs. 1000 would there be if you bought a spade?	
3. What is the cost of two pots and a hedge trimmer?	
4. What would be the total cost of 5 packets of grass seeds? What change would there be from Rs 500?	
5. What is the difference in price between the lawn mower and hedge trimmer?	

Feedback (10 mins)

Ask each group to share the findings of their activity worksheet.

Written Assignments (40 mins)

Pg.103 word problem Q.5, 6, 7, and 8

Wrap up (5 mins)

Ask the students to see the price of their Maths book and divide it by 100. What would be the result?

5 Measurements

Suggested Time Frame

16-18 periods

Learning Curve

In their previous class students have already worked with units of length, mass/weight, and volume/capacity. They are well aware of addition, subtraction and conversion of units of length, mass and capacity involving the same units. This will lead them to addition and subtraction of different units of measure.

They also have knowledge of how to use a.m. and p.m. to record time in analogue and digital clocks. The previous knowledge of conversion of units of time will help them to make conversions with years, months, weeks, days. This knowledge will enable them to solve real life problems including length, weight, capacity, and time.

Real-life Application

Time is a very important factor and we find it inevitable in our daily life, for example, travelling, working and other activities involve time.

Length, weight, and capacity are important in day to day life. The long and short distances (km and m), weighing grocery (kg and g), measuring liquid (l and ml) are units of measurements used in our daily life. The schedules, events, programmes, appointments, and meetings etc. involve time as the basic factor.

Frequently Made Mistakes

Students make mistakes when they add or subtract the units of measures. They need to be careful to write the same units in one column while adding or subtracting.

Summary of Key Facts

- The system of measurement based on multiples of 10 is called the metric system.
- The standard units of weight are kilograms (kg) and grams (g).

- The standard unit of volume/capacity is litres (l) and millilitres (ml).
  1 km = 1000 m
  1 kg = 1000 g
  1 l = 1000 ml

Suggested Activities

Pair Activity (30 mins)
Learning Outcome: convert grams to kilograms.

Resources: worksheet

Instructions: There are two trucks A and B which can each carry a total of three crates. The total weight of the crates must be exactly 200 kg. The weight of individual crate is given below.

These trucks can each carry a total of three crates. The total weight of the crates must be exactly 200 kg.

Crate 1: 80590 gm = ________ kg Crate 2 : 60590 gm = ________ kg Crate 3 : 85170 gm = ________ kg Crate 4 : 62570 gm = ________ kg Crate 5 : 76840 gm = ________ kg Crate 6 : 34240 gm = ________ kg
Which crates does each truck take? **Truck : A** ________ kg + ________ kg + ________ kg = 200 kg **Truck : B** ________ kg + ________ kg + ________ kg = 200 kg

Individual Activity (20 mins)

Learning Outcome: Convert litres to millilitres.

Resources: Worksheet

Instructions:

Take the students out of the classroom. Arrange 2 buckets of capacity 3 litres and a jug of capacity 300 millilitres. Fill one bucket with water. Divide the class into two groups. Call one group and ask them to fill the empty bucket by taking water from the filled bucket using the jug. Instruct them to count the number of jugs they transfer from one bucket to the other.

Now repeat the same activity with the other group.

Ask them how many jugs of water were used to fill the other bucket.

Explain to them that ten 300 ml jug will make 3 litres. Give them the following worksheet to solve individually.

A full bucket holds 3.8 liters. A jug holds 200 ml. How many jugs will fill the bucket?
3.8 litres = ____________________ ml
Number of jugs needed to fill the bucket = ___________

Individual Activity (20 mins)

Learning Outcome: To convert units of time.

Resources: Paper/Whiteboard, Pencil/Marker

Instructions:

Ask each student to write their age in (they can use paper or white board).

- Years
- Months
- Weeks
- Days

Individual/Pair Activity (20 mins)

Learning Outcome: Add units of time.

Resources: Activity Sheet

Instructions:

Rabia wants to go to her aunt's house. She is timing how long it takes her to reach there. Write the time in the box as time passes.

Telling Time Through Tick Tock	
Rabia starts her journey at [11.30 am].	
	What time is it now?
Tick tock 5 minutes have passed.	[ ]
Tick tock 8 more minutes have gone by.	[ ]
Tick tock 11 more minutes have gone by.	[ ]
Tick tock 3 minutes have passed.	[ ]
Tick tock 22 minutes have passed.	[ ]
Tick tock 17 minutes have gone by.	[ ]
Tick tock 21 more minutes have passed.	[ ]
How much time did she take to reach her aunt's house? ______________ hours ______________ minutes.	

Model Lesson Plan

Topic

Conversion of units of length

Duration

80 minutes

Specific Learning Objectives

By the end of the lesson students will be able to convert different units of length.

Key Vocabulary

units of lengths, stair diagram, km, m, cm, mm

Resources

Worksheet

Strategy (5 mins)

Starter: Engagement Activity

Ask the students: What are the units of measurement for length?

Is it possible to convert units of measurement of length? Like km into m or m into km.

Main Developmental Activity

Teacher's Exposition (10 mins)

Ask the students the factors of conversion from km to m, m to cm, and cm to mm. Reinforce the multiplication and division of numbers by powers of tens, then write a few conversion sums on the board and write the answers, taking students' feedback.

Now give them the following activity sheet to work in pairs or independently.

Individual Activity (25 mins)

Instructions:

Jawad, Taha, and Jibran were competing to see how far they could run in 10 minutes. They did not record their distance in the same units. Convert the units into other units as asked.

Jawad ran 2 kilometres = ____________ metres = ____________ centimetres. Taha ran 3500 metres = ____________ centimetres and ____________ millimetres. Jibran ran 250000 centimetres = ____________ millimetres and ____________ kilometres. In total, together they ran ____________ kilometres = ____________ metres = centimetres and ____________ millimetres.
Who ran the farthest? ____

Written Assignments (30 mins)

Ex 5 a Q.7 and 8

Wrap up (10 mins)

Give a quick recap of the lesson to the class and discuss the following two questions

1. Which is the biggest unit of length and which is the smallest unit of length?
2. Where do we see these units of length in our daily lives?

6 Perimeter and Area

Suggested Time Frame

8-10 periods

Learning Curve

In previous classes, students have calculated perimeter of a square and a rectangle (by using the formula). Now, they will calculate the area of some simple shapes i.e. square and rectangle. They will further move on to calculate areas of some composite shapes also.

Real-life Application

Area and perimeter play an important role in our daily lives. Whenever we want to cover a room's floor with tiles or carpet, we need to calculate the area of the floor. Similarly, in construction of any building or any infrastructure we need to know its perimeter and area.

Frequently Made Mistakes

Students often confuse area with perimeter. Area and perimeter deal with 2-D shapes, but sometimes students associate area and perimeter with 3 D shapes, which is not correct.

Summary of Key Facts

- Perimeter is the boundary of a closed shape.
- To find the perimeter of a shape, start from a point and add all sides clockwise or anti clock-wise until you reach the point from where you started.
- The amount of surface a shape covers is called its area.

Suggested Activities

Individual Activity (20 mins)

Learning Outcome: Calculate area and perimeter of a square.

Resources: centimetre grid

Instructions:

- Each student is provided with a centimeter grid and asked to draw a square. (Using any measurements of their choice).
- Students now calculate the area and perimeter of their drawn squares.
- Compare your result with that of your classmates.
- Find out whose square has the largest area.

Group Activity (20 mins)

Learning Outcome: Find the area and perimeter of composite shapes.

Resources: Coloured tape/masking tape, measuring rulers, activity sheets.

Instructions:

- Make different composite shapes on your classroom's floor using tape and mark them A, B, C and so on. (Make as many shapes as the number of groups in your class).
- Divide the class into groups of 4.
- Write A, B, C etc. on chits, fold them and ask each group to pick one chit.
- Each group will calculate the area and perimeter of the composite shape mentioned on their chit.
- Two groups can be given the same shape as well so that they can compare their answers in the end.

Individual Activity (20 mins)

Learning Outcome: Calculate area and perimeter of a rectangle

Resources: Worksheet

Instructions:

Your school's football Association just built a new practice field that is 100 metres long and 67 metres wide. What is the area and perimeter of the new field?
Area = ________________ Perimeter = ________________

Model Lesson Plan

Topic
Area and perimeter

Duration
80 minutes

Specific Learning Objectives
By the end of the lesson students will be able to calculate area and perimeter of a rectangle. They will also find the unknown length or breadth of the rectangle.

Key Vocabulary
Area, perimeter, rectangle, length, and breadth

Resources
White boards, rulers, measuring tape, and activity sheets.

Strategy
Starter: Engagement Activity (5 mins)

Recall: Write down the following questions on the board.

1. What is the formula for the area of a square and a rectangle?
2. What is the formula for the perimeter of a square and a rectangle?

Students will write the answers of the above questions on the white boards. Ask students to raise their white board so that you can see their work.

Main Developmental Activity
Pair Activity (20 mins)

Instructions:

- Divide your class into pairs and ask them to walk around in the class and find one rectangular object.
- It can be their whiteboard, class door, the soft board, their lunch box, class window etc.
- Each pair will then measure the sides of their chosen rectangular object and calculate its area and perimeter in the given activity sheet.

Activity sheet:

Shape	l = length	b = breadth	perimeter (P)	area (A)

Now tell the students that they can find the unknown length or breadth of a rectangle by using the formula. Tell them that if area and length is given, breadth can be found by dividing the area by the length. Similarly, length can be found by dividing the area by the breadth.

Give them some examples on the board.

Feedback (10 mins)

Take feedback from each pair about their findings and share with the whole class.

Written Assignments (40 mins)

Ex 6 Q 14, 15 and 18

Wrap up (5 mins)

Have a short discussion on the importance of area and perimeter of simple shapes (square and rectangle) in practical life.

7 Geometry

Suggested Time Frame

10-12 periods

Learning Curve

Students already know 2 D and 3 D shapes. They have dealt with triangles and quadrilaterals. They know what parallel lines are and they have also worked with line segments. Here, they learn how to draw different types of lines which include straight, curved, vertical, and parallel lines. They will learn to draw angles using protractor. They will construct squares and rectangles with sides of given measures. They will learn centre, radius, diameter, and circumference of a cifcle.

Real-life Application

- The global positioning system uses geometrical principles to locate a position, navigate from one location to another, and tracking objects or personal movements.
- Geometry helps in the accurate calculation of physical distances.
- Geometry is used by astronomers to map the distance between planets and stars.
- Geometry also helps in computer aided designs; it entails lines, curves, and angles.
- Geometry is used in designing buildings, walls, and doors.
- Video games also include the concepts of geometry.

Frequently Made Mistakes

Students usually make mistakes when they measure angles with a protractor.

Summary of Key Facts

- A line is a set of points, placed together.
- A line segment is the shortest distance between two points.

- A ray has one end point only, and goes on and on, in the direction of the arrow.
- There are 5 types of angles:

  Right angle

  Acute angle

  Obtuse angle

  Straight angle

  Reflex angle
- A circle has a complete turn of 360°.
- Half of a circle is called a semi-circle.
- The line joining two points on the circumference and passing through the centre of a circle is called the diameter.
- Half of the diameter is called the radius.
- There are many special kinds of quadrilaterals, for example, a square, a rectangle, a parallelogram, a trapezium, and a rhombus.

Suggested Activities

Individual Activity (20 mins)

Learning Outcome: Identify different kinds of angles, line segments, parallel and non-parallel lines.

Resources: Activity Sheet

Instructions:

- Distribute the activity sheet to each student.
- Have a short discussion about the angles and lines with the whole class.
- Ask them to solve the worksheet.

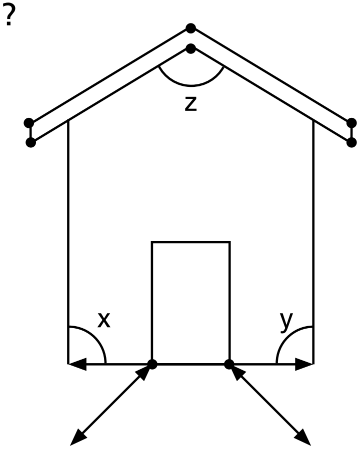
Look at the house and answer the questions.

1. Identify a line segment in the given figure and mark it AB.
2. How many rays can you find in the picture given above?
3. Find a pair of parallel lines and mark them CD and EF.
4. Find a pair of non-parallel lines and mark them GH and IJ.
5. Calculate the measure of the following angles:

$\angle X$ = ____________________

$\angle Y$ = ____________________

$\angle Z$ = ____________________



Individual Activity (20 mins)

Learning Outcome: Drawing angles.

Resources: Protractor, Activity Sheets, Mystery Box, Geometry Box, Paper chits.

Instructions:

- Distribute blank paper chits to all students.
- Ask the students to write one measure of their choice for each, an acute and an obtuse angle, on the paper given to them. (This will help the teacher to assess if the students know what acute and obtuse angles are).
- Now ask the students to fold the chits and put them in the empty mystery box.
- Shuffle the chits and distribute empty activity sheets to all students.
- Ask each student to draw a chit from the mystery box.
- Each student will draw an acute and an obtuse angle obtained from the mystery box, in their activity sheets.
- Spot check the measures of the angles for accuracy.

Individual Activity (25 mins)

Learning Outcome: Construct a square and a rectangle with sides given, using protractor and set squares.

Resources: Protractor, set squares, mystery box, question chits, activity sheet.

Instructions:

- Make a mystery box and put chits in it with questions written on them such as:
  - ➢ Draw a square with sides of length 4.5 cm
  - ➢ Draw a rectangle with a width of 2 cm and a length of 6 cm etc.
- Allow each student to draw a chit from the box and perform the task on the given activity sheet.
- Students can later peer check the activity sheets under teacher's supervision.

Individual Activity (15 mins)

Learning Outcome: Identify centre, radii, and diameters of a given circle.

Resources: Activity Sheets

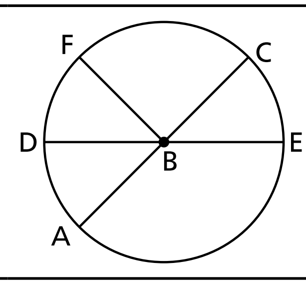
Instructions:

- Have a short discussion about the parts of a circle with the whole class.
- Distribute the activity sheets.
- Explain the task to them.

Activity Sheet

Look the circle and write the answers.

1. Name the centre of the circle. ___________
2. How many radii are shown in the given circle? ___________
3. Name the diameters shown in the circle. ___________



Group Activity (20 mins)

Learning Outcome: Identification of angles.

Resources: Activity Sheet

Instructions:

- Divide the class into 4 groups.
- Distribute activity sheets to the students and explain the task.
- Take students to school ground and ask them to spend 15 minutes there looking for different kinds of angles around them.
- Ask them to note down their findings in the activity sheet.
- Give them examples e.g. they may spot a tree branch making an obtuse or acute angle with the tree trunk etc.
- Tell them to identify the kind of angle only that the object is making and hence they do not need to measure it.

Activity Sheet	
Object	**Type of Angle**

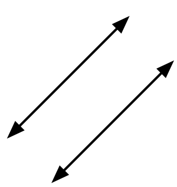
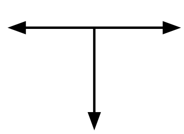
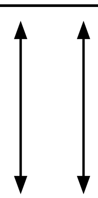
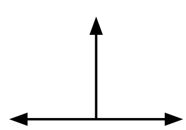
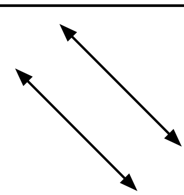
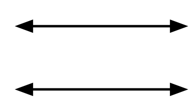
Individual Activity (15 mins)

Learning Outcome: Drawing of parallel and perpendicular lines.

Resources: Activity Sheet.

Instructions:

- Have a short discussion about parallel and perpendicular lines with the students.
- Draw few lines on the board and ask them to identify.
- Give them the activity sheet and explain the task.

Activity Sheet					
Identify the parallel and perpendicular lines and write their names in the space given.					
					

Model Lesson Plan

Topic

- Identification of straight line, line segment, ray, and angle.
- Construction and measurement of angles.

Duration

80 minutes

Specific Learning Objectives

By the end of the lesson students should be able to:

- differentiate between a line segment and a ray.
- construct an acute angle.

Key Vocabulary

straight line, line segment, ray, angle, protractor

Resources

Big geometry box, Japanese fan and A4 size sheet.

Strategy

Starter: Engagement Activity (10 mins)

Draw two lines AB and CD of different length on the board.

Start your lesson by giving a challenge to your students. Ask them if they can tell without measuring which line is longer, AB or CD?



Main Developmental Activity

They already know what a line is. Now introduce a ray and line segment. Tell them the specific points which differentiate between a line segment and a ray. Draw different diagrams on the board showing them line segments and rays.

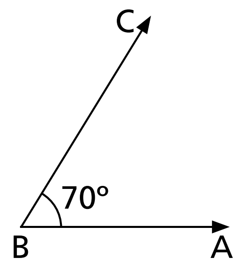
Take a Japanese fan to introduce the lesson on angles. Turn one arm of the fan so that the gap between the two arms increases. Tell them angle is the special word used to describe the amount of turn between the two arms and its symbol is °. The unit to measure angles is called degree and is written as °.

Now widen the gaps between the two arms of the fan, naming the different angles:

1. When one arm is horizontally straight and the other is vertically straight, a right angle is formed.
2. When the angle is smaller than a right angle, it is called an acute angle.

3. When an angle is bigger than a right angle, but not big enough to form a straight line, it is called an obtuse angle.
4. When the angle goes beyond the straight line, it is called a reflex angle.
   - Use wooden geometry box and demonstrate on the board, how to construct and measure the angle.
   - Distribute white A4 size paper to individual students and ask them to follow your demonstration.

In order to construct an angle, draw a horizontal, straight line AB first. Place the protractor in such a way that the middle of its bottom line is exactly on A. Call out a number, say 70. Put a point, say C, on the board, and see the number 70 on the protractor and then join the points A and C to make the arm AC of the resulting angle. The measure of this angle is 70° and we write, ∠CAB = 70°.



Thereafter, the teacher demonstrates that when the fan makes a complete turn, a circle is constructed and the central angle of a circle is 360°.

Written Assignments (20 mins)

Ex 7 b Q.11, 12, 13, 14

Wrap up (10 mins)

End your lesson by asking students if the clock shows 3 o'clock, which angle is it? And if it shows quarter past 1, then which angle is it?

8 Information Handling

Suggested Time Frame

4-6 periods

Learning Curve

In Class 3, children have worked with pictographs, they know how to read and interpret it. Here, they read and interpret bar and line graphs.

Real-life Application

Bar diagrams and line graphs are useful while interpreting rainfall records, people preferences, cost price analysis, temperature, and census.

Frequently Made Mistakes

Students often make mistakes while drawing bar graphs, they leave no space between the bars and confuse bar graphs with histogram.

Summary of Key Facts

- A bar graph or bar chart is a graphical presentation of data using bars of different heights or lengths.
- Bar graphs can be drawn vertically or horizontally.
- line graphs are useful when we want to measure something which is gradually changing.

Suggested Activities

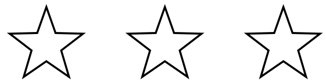
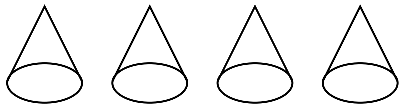
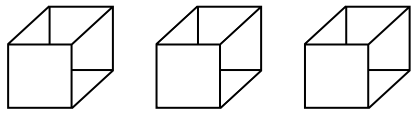
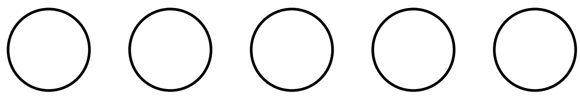
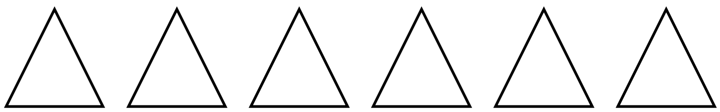
Pair Work Activity

Learning Outcome: Read and interpret a picture graph.

Resources: Worksheet

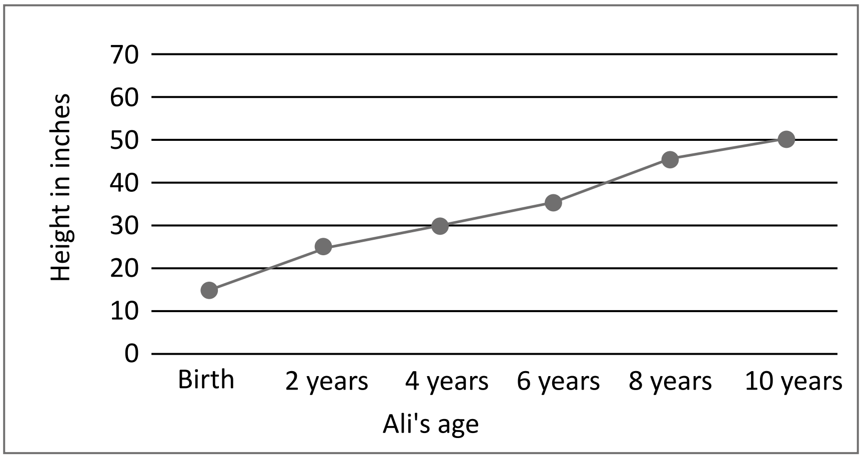
Instructions:
This is a picture graph of 2D and 3D liked by the students of class 4.

Use the information from the graph to answer the questions given below:

2D and 3D shapes	**Rectangle**	
	Star	
	Cone	
	Cube	
	Circle	
	Triangle	

1. How many students like triangles? ______________
2. How many students like rectangles? ______________
3. How many students like circle? ______________
4. Do more students like cubes or cones? ______________
5. Which is the most popular shape? ______________
6. How many students like stars? ______________

Individual Work
Learning Outcome: Read and interpret a line graph.
Resources: Worksheet.
Instructions:
Ali's family have kept track of his height, opposite is the line graph showing how tall he has grown over the years. Use the graph to answer the questions.



1) How tall was Ali when he was 2 years old? ______________
2) How much has Ali grown from the time he was born to when he was 4 years old? ______________
3) How old was Ali when he was 50 inches tall? ______________
4) How many inches did his height increase from when he was 8 years old to when he became 10 years old? ______________
5) When was his growth the fastest? ______________

Model Lesson Plan

Topic
Bar graphs

Duration
80 minutes

Specific Learning Objectives
By the end of the lesson students should be able to read and interpret bar graphs.

Key Vocabulary
data, information, and bar graph or bar diagrams

Resources
Chart paper with a bar graph drawn on it.

Strategy

Starter: Engagement Activity (5 mins)

Display a chart paper showing the bar graph of students and their favourite subjects. Ask the students whether they understand what information is given in this bar graph? Can they think of the most favourite and least favourite subjects? Help them out if there is any difficulty or confusion.

Main Developmental Activity (10 mins)

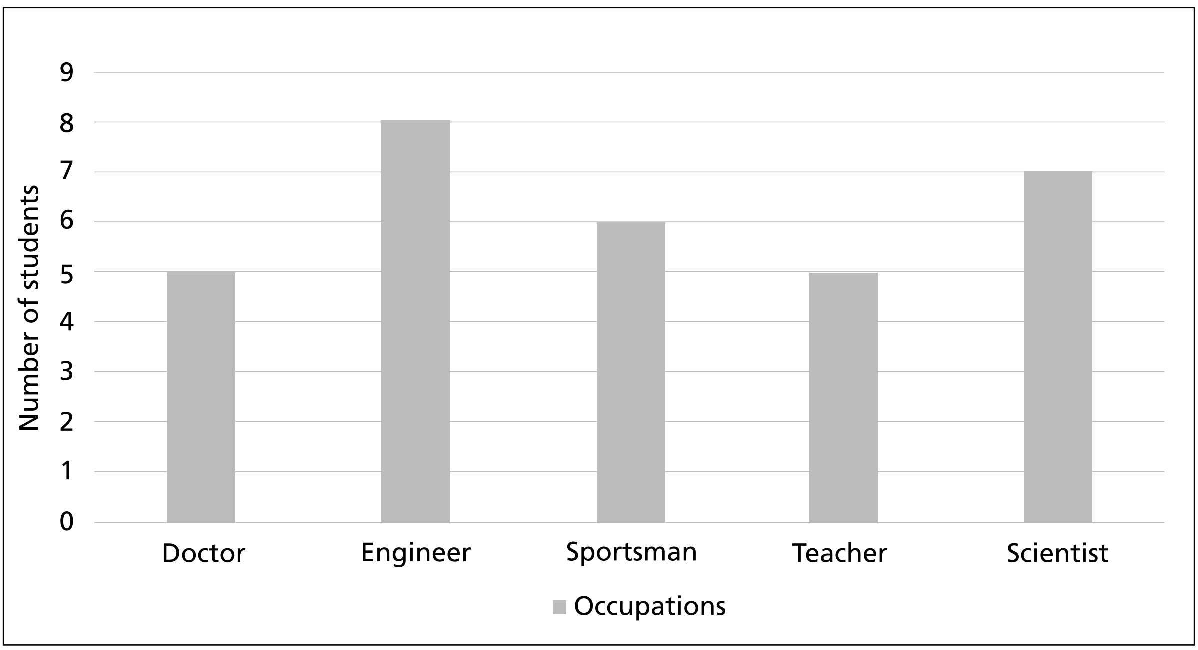
Conduct a whole class discussion recalling the prior knowledge of data handling.

Pair Work (10 mins)

The same chart paper will remain on display, ask the following questions and try to involve each and every student and make them clear on each and every point.

1. Which subject is the most popular among students? Why do you think so?
2. Which subject is least popular among students? Why do you think so?
3. How many students are there in total?
4. How many students liked the subject English?
5. How many students liked the subject Urdu?

Students of grade 4 were asked about what they want to be when they grow up. Their responses are recorded in the given bar graph. Read the graph carefully and answer the questions given below:



How many students want to be scientists? ______________

How many students have chosen engineering as their future career? ______________

How many students are interested in sports? ______________

How many students want to take up the same career as their teachers? ____________

Which two occupations have the same number of votes? ____________

How many students were present on the day of this survey? ____________

Written Assignments (30 mins)

Ex 8 Q. 1, 2.

Wrap up (5 mins)

Ask students where they apply bar graphs in their daily life?

Notes

Notes